

Chapter 4

LEARNING AND BEHAVIOR

*Native ability without education
is like a tree without fruit.*

ARISTIPPUS



LEARNING AND BEHAVIOR

The intent of the *Comprehensive Health Education and Physical Education Standards* is to ensure that all students are provided the education to make safe, appropriate, and healthful choices—now and throughout life. The term “all students” includes students who are college-bound or career-bound, students who are academically talented, students whose native language is not English, students with disabilities, and students from diverse socioeconomic backgrounds. It conveys a commitment that male and female students will achieve at comparable levels across all areas. In addition, students who can do more than achieve the content *Standards* should be afforded the opportunity to do so.

Some might argue that time spent on health and physical education might be better spent on studying classic literature or the life cycle of a tree frog. If the purpose of public education is to prepare young people to become responsible citizens, gainfully employed and self-sufficient, then the rationale for instruction in health and physical education should become clearer. It has been said that students learn better when they are healthy. If students are empowered to make responsible choices about their health now, they will be better able to focus on the study of all other content areas. In the long run, students who are more conscious of the health choices they make are more likely to become healthy, contributing members of the workforce.

This chapter focuses on theories and models of human development that should guide the development and implementation of a comprehensive health and physical education program. It examines elements of the behavioral and social sciences as well as learning theories and models that influence student achievement and health behavior. This chapter is merely an overview. For more information, review some of the references cited at the end of this *Framework*.

LEARNING AND THE HUMAN BRAIN

The cognitive sciences have seen a number of developing theories and research studies that use biological processes to explain learning. While these research approaches are easier to control and study, it is difficult to assimilate the information into concrete principles that teachers can implement. Neuroscientists still disagree on some of the inner workings of the brain. With this in mind, here is one simplified explanation of how the brain learns along with some simple suggestions to enhance students' learning.

Learning changes the brain. With each new stimulation, experience, and behavior the brain can rewire itself. A *stimulus* to the brain starts the process. If we are repeating something we have already learned, the neural pathways become more efficient. Research has shown that many areas of the brain are involved in new tasks but less and less of the brain is involved as the task is learned (Jensen, 1998). The brain's neural networks combine to process an object or event; each area is responsible for a particular element of the task (e.g., color, spatial movement). The daily chemistry of the human brain complicates things even more. The human brain contains dozens of types of *neu-*

rotransmitters, classified both functionally and chemically. Neurotransmitters send either an excitatory or inhibiting message to the receiving *neuron*, much like an on/off switch. This mechanism enables the brain to focus attention or limit activity. Chemically, these substances include *amino acids*, such as glutamate; *monoamines*, such as dopamine or serotonin; and *peptides*, such as endorphins or vasopressin (Sylwester, 1995). An in-depth understanding of neurotransmitters is essential for all teachers **but particularly necessary for health and physical education teachers**. For example, peptides play an important role in modulating emotional states and consequent behaviors. These substances play an important role in the body's response to stress. In addition, exercise and positive social interactions can elevate endorphin levels and help people feel good about themselves (Sylwester). The implications for teachers of health and physical education should be obvious.

WHAT ARE MULTIPLE INTELLIGENCES?

In his Theory of Multiple Intelligences, Harvard psychologist Howard Gardner suggests that intelligence has more to do with the capacity for solving problems and fashioning products in a context-real and naturalistic setting (Armstrong, 1994). Gardner's theories have been embraced by educators as a way to map the broad array of abilities seen in the classroom. Figure 8 outlines classroom applications of Gardner's theory.

Certain points of Gardner's model are important to remember when planning instruction.

Each person possesses all seven intelligences. The theory proposes that all individuals have capacities in all seven areas. Most people are highly developed in some intelligences, modestly developed in others, and relatively underdeveloped in the remaining areas.

Most people can develop each intelligence to an adequate level of competency. If given the appropriate encouragement, enrichment, and instruction, most people can develop all seven intelligences to a reasonably high level.

Intelligences usually work together in complex ways. Intelligences are always interacting with each other. In a kickball game, a child must kick the ball, run to the appropriate spot, and keep score, using three kinds of intelligence to participate in the activity.

There are many ways to be intelligent within each category. This theory emphasizes the many ways individuals show their gifts within their intelligences as well as between the intelligences. For example, a person may not be able to read but may be able to tell a terrific story (Armstrong, 1994).

Figure 8

SEVEN WAYS OF TEACHING

Intelligence	Teaching Activities	Teaching Materials	Strategies
Linguistic	Lectures, discussions, word games, choral reading, storytelling, journal writing	Books, tapes, computers, stamp sets, books on tape	Read about it, write about it, talk about it, listen to it
Logical/Mathematical	Brain teasers, problem solving, science experiments, mental calculation, number games, critical thinking	Calculators, math manipulatives, science equipment, math games	Quantify it, think critically about it, conceptualize it
Spatial	Visual presentations, art, imagination games, mind-mapping, metaphor, visualization	Graphs, maps, video, LEGO sets, art materials, optical illusions, cameras, picture library	See it, draw it, visualize it, color it, mind-map it
Bodily-Kinesthetic	Hands-on learning, drama, dance, sports, games, tactile activities, relaxation exercises	Building tools, clay, sports equipment, manipulatives, tactile learning resources	Build it, act it out, touch it, get a “gut feeling” of it, dance it, perform it, move it
Musical	Super-learning, rapping, songs	CD player, tapes, instruments	Sing it, rap it, listen to it, play it
Interpersonal	Cooperative learning, peer tutoring, community involvement, social gatherings, simulations	Board games, party supplies, props for role-play	Teach it, collaborate on it, interact with respect to it
Intrapersonal	Individualized instruction, independent study, options in course of study, self-esteem building	Self-checking materials, journals, materials for projects	Connect it to your life, make choices about it, self analysis

Adapted from: Armstrong, T. (1994). Multiple intelligences in the classroom. Alexandria, VA: ASCD.

MOVEMENT AND LEARNING

Research conducted by neurophysiologist Carla Hannaford indicates that the inner ear's semicircular canals and the vestibular nuclei are an information-gathering and feedback source for movement. The impulses travel through nerve tracts back and forth from the cerebellum (the part of the brain involved in almost all learning) to the rest of the brain, including the visual system and the sensory cortex. These impulses also seem to impact areas in the brain critical to attention. All together, these actions help human beings to maintain balance, turn thought into action, and coordinate moves. Hannaford supports participation in activities that stimulate inner ear motion such as swinging, rolling, and jumping (Jensen, 1998).

Other researchers have linked pathways from the cerebellum to parts of the brain involved in memory, attention, and spatial perception. Movement and learning seem to have “constant interplay” (Jensen 1998). More than 80 studies presented at the 1995 Annual Society of Neuroscience Conference suggested strong links between the cerebellum and memory, spatial perception, language, attention, emotion, nonverbal cues, and decision-making. According to Eric Jensen (1998), a former teacher and member of the International Society of Neuroscience, these findings strongly implicate the value of physical education, movement, and games in boosting cognition. Research suggests that the relationship between movement and learning continues throughout life.

In the same way that exercise “shapes up” the heart, muscles, lungs, and bones, physical activity strengthens the basal ganglia, cerebellum, and corpus callosum. These areas of the brain influence and control conscious and automatic movement (e.g., being able to walk, talk, and chew gum at the same time!) (Slywester, 1995). Exercise also provides the brain with extra oxygen to enhance greater connections between neurons. Researchers James Pollatschek and Frank Hagan conclude that “children engaged in daily physical education show superior motor fitness, academic performance, and attitude towards school as compared to their counterparts who do not participate in daily physical education” (Jensen, 1998, p. 85). In a Canadian study of 500 children, those enrolled in a daily, one hour physical education class far outperformed at exam time those who did not exercise (Hannaford, 1995).

Essentially, exercise prepares the brain to respond rapidly to challenges. Neuroscientists at the University of California-Irvine discovered that exercise releases a neurotrophic factor that enhances cognition by heightening neuron communication. During a workout, the cerebellum is in high gear. Other studies have shown that children who exercise have higher exam scores and improved short-term memory, reaction time, and creativity (Jensen, 1998). Finally, Arthur Stone of the State University of New York at Stony Brook says: “Having fun may be good for your health. It decreases stress and improves the functioning of the immune system for the three days after the fun.” (Jensen, p. 87). For these reasons, all educators ought to be purposeful about integrating physical activity into everyday learning. Larry Abraham, professor at the University of Texas at Austin, states “Classroom teachers should have kids move for the same reason physical education teachers have kids count.” (Jensen, p. 88).

CHANGING HEALTH BEHAVIOR

In spite of increased research into the benefits of healthful eating, regular exercise, and other health-promoting strategies, there continues to be an increased need to develop interventions that promote such behaviors. Numerous theories and models have been used in behavioral and social science research to study and promote health-enhancing behaviors. These theories have major implications for classroom instruction and for school and community programs that support and reinforce classroom instruction. The theories are particularly significant when designing prevention and intervention programs that are synergistic, coordinated, and complementary. Key elements of some of the more widely acknowledged theories are summarized in Figure 9.

At one time, it was thought that providing students with facts would result in behavior change. Through research, it has been determined that lack of knowledge is only one of many factors that influences decision making. Given that experts in both health and education have recognized the variety of factors that influence learning and behavior, it seems prudent to institute multiple interventions to foster the adoption of health-enhancing behaviors. Students need to be armed with the knowledge and skills to address a myriad of problems, now and in the future. The decisions made now can have a significant impact on one's quality of life in the future (Allensworth, Symons & Olds, 1994).

SUMMARY

This chapter only scratches the surface of the exciting ideas and theories about how children learn, how movement impacts learning, and how best to structure learning experiences to support health-enhancing behaviors. As an increasing number of programs are developed and tested, this research becomes more important to professional practice. Educators are urged to review some of the materials noted in the reference list for more detailed information about this exciting area.

Figure 9**HEALTH BEHAVIOR THEORIES**

THEORY/MODEL	LEVEL	KEY CONCEPTS	EXAMPLE
Classic Learning Theory	Individual	Cues Shaping Reinforcement/rewards ■ Future (looking better) ■ Extrinsic (praise) ■ Intrinsic (feel good)	■ A person establishes a daily walking program and rewards self with a new outfit.
Health Belief Model	Individual	Perceived susceptibility Perceived severity Perceived benefits of action Cues to action Self-efficacy	■ A person decides to use a condom based on his/her perceived susceptibility to HIV (just tested after a “scare”).
Transtheoretical	Individual	Precontemplation Contemplation Preparation Action Maintenance (A five-stage continuum related to readiness to change)	■ Sedentary individuals check out fitness clubs and programs.
Relapse Prevention	Individual	Skills training ■ Coping ■ Stress management Risk identification ■ Situational Lifestyle rebalancing ■ Finding solutions	■ An individual has stopped smoking but always has the urge to smoke at parties.
Social Cognitive/ Social Learning	Interpersonal	Environmental influences Personal factors Attributes of the behavior Self-efficacy, confidence, and positive expectations Value the outcome (immediate and long-term) Modeling	■ A person feels energized and better about him/her self after regular exercise and is complimented on performance by the teacher.

Figure 9 (continued)

THEORY/MODEL	LEVEL	KEY CONCEPTS	EXAMPLE
Planned Behavior/ Reasoned Action	Interpersonal	Intention to perform <ul style="list-style-type: none"> ■ Attitude ■ Outcome expectations ■ Value of outcome Social environment <ul style="list-style-type: none"> ■ What others think ■ Motive to comply Perceived control <ul style="list-style-type: none"> ■ Opportunities ■ Skills and resources 	<ul style="list-style-type: none"> ■ A person consumes a low fat diet and begins an exercise program, resulting in weight loss that becomes noticed by co-workers who are always trying to lose weight and wear fashionable clothes.
Social Support	Intrapersonal	Instrumental Informational Emotional Appraisal	<ul style="list-style-type: none"> ■ Give a non-driver a ride to an exercise class. ■ Tell a neighbor about a walking program. ■ Call to offer support to a friend quitting smoking. ■ Provide feedback to a friend trying out new skills.
Ecological Approaches (Multiple Levels of Influence)	Environmental	Supportive environments that implement personal skills <ul style="list-style-type: none"> ■ Intrapersonal ■ Group ■ Institutional ■ Community ■ Public policy ■ Individual ■ Organizational ■ Governmental (Schools, work sites, healthcare facilities, communities) 	<ul style="list-style-type: none"> ■ A community creates bike and roller blade paths for citizens to exercise. ■ An employer encourages staff to bike to work or provides an employee assistance program. ■ School policies support a drug-free environment.

Adapted from Centers for Disease Control and Prevention. (1996). Physical activity and health: A report of the Surgeon General. Atlanta, GA: Author.